

REMARKS/ARGUMENTS

Reconsideration of the application as amended is respectfully requested.

Status of Claims

Claims 1-21 are pending in the application, with claim 1 being the only independent claim.

Claim 18 has been amended to depend from claim 8. Otherwise, claims 13 and 18 are identical.

Applicants respectfully submit that the amendment to claim 18 does not raise any new issues that would require further consideration and/or search by the Examiner.

Overview of the Office Action

Claims 1-4, 6-18, 20 and 21 stand rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,535,537 (*Kinoshita*).

Claim 5 stands rejected under 35 U.S.C. §103(a) as unpatentable over *Kinoshita* in view of U.S. Patent No. 6,636,539 (*Martinsen*).

Claim 19 has been indicated to be allowable if suitably rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Summary of Subject Matter Disclosed in the Specification

The following descriptive details are based on the specification. They are provided only for the convenience of the Examiner as part of the discussion presented herein, and are not intended to argue limitations which are unclaimed.

The specification discloses a semiconductor laser apparatus having a vertical emitter (2) and a pump laser (5) for optically pumping the vertical emitter (2). The vertical emitter (2) and the

pump laser (5) are monolithically integrated. During operation, the pump laser (5) has a radiation-emitting zone (6) at a first temperature T1, and the vertical emitter (2) has a radiation-emitting zone (3) at a second temperature T2. T1 is lower than T2. See Figs. 1-2B; paragraphs [0005], [0021], [0028] to [0030] and [0038] of the published specification.

This advantageously results, on the basis of the temperature dependency of the emission wavelength, in the emission wavelength of the vertical emitter (2) being higher than the emission wavelength of the pump laser (5), even though the radiation-emitting zones (3, 6) of the vertical emitter (2) and the pump laser (5) have the same structure. Consequently, the pump laser (5) and the vertical emitter (2) can be produced jointly by a single epitaxy step without the need to manufacture the pump laser (5) and the vertical emitter (2) in separate, successive epitaxy steps. See paragraph [0008] of the published specification.

Arguments

Independent Claim 1

Applicants respectfully submit that claim 1 is not anticipated by *Kinoshita* because *Kinoshita* does not disclose, either expressly or inherently, each and every element as set forth in claim 1.

In particular, *Kinoshita* does not teach or suggest that during operation, a pump laser has a radiation-emitting zone at a first temperature T1, a vertical emitter has a radiation-emitting zone at a second temperature T2, and the first temperature T1 is lower than the second temperature T2.

As discussed in detail in the Response dated December 13, 2005, *Kinoshita* acknowledges that most of the heat that is generated during operation of the device occurs

extensively in the electrically pumped semiconductor laser devices. See col. 5, lines 39-48 of *Kinoshita*. More particularly, *Kinoshita* states “since no current passes through the mesa 10 that is the vertical resonator, it is possible to avoid the problem of temperature rise due to a high current density, which can occur in a conventional VCSEL”. See col. 5, lines 44-48 of *Kinoshita*.

Therefore, *Kinoshita* teaches that current flows only through the pump laser (30) (i.e., the only electrically pumped laser in *Kinoshita*), not through the circular cylindrical mesa or vertical emitter (10), and a temperature rise in the vertical emitter (10) is avoided by eliminating current flow through the vertical emitter (10). As result, in *Kinoshita*, the pump laser (30) has a temperature T₁ which is higher than the temperature T₂ of the vertical emitter (10). Thus, *Kinoshita* teaches that T₁ is higher than T₂.

In sharp contrast, claim 1 of the present application specifically recites that “during operation, the pump laser has a radiation-emitting zone at a first temperature T₁ and the vertical emitter has a radiation-emitting zone at a second temperature T₂, and the first temperature T₁ is lower than the second temperature T₂.”

The Examiner contends (page of the Office Action) that in *Kinoshita* T₁ must be lower than T₂ on the ground that:

“It is inherent that a radiation emitting zone of the pump laser produces less heat/lower temperature than that of the vertical emitter because the vertical emitter provide more powerful laser beam than that of the pump laser.” (emphasis added)

The Examiner’s reasoning is incorrect because it violates the fundamental law of energy conservation under which it is impossible for an exclusively optically pumped laser to emit more optical energy than it receives from the pump laser.

The vertical emitter (10) of *Kinoshita* is exclusively optically pumped by the pump laser

(30). As such, the vertical emitter (10) does not, and cannot, provide a more powerful laser beam than that of the pump laser (30); otherwise, the vertical emitter (10) would generate additional energy from nothing. Consequently, the Examiner's so-called "inherency" argument cannot stand. If the Examiner remains of a contrary view, he is respectfully requested to point out exactly where in relevant textbooks, treatise or articles support for such a view exists.

In view of the foregoing, withdrawal of the 35 U.S.C. 102(e) rejection of claim 1 is respectfully requested.

Moreover, applicants respectfully submit that the above-discussed fundamental differences between claim 1 and *Kinoshita* clearly and patentably distinguish claim 1 thereover under 35 U.S.C. 103.

Dependent Claims 2-21

Claims 2-21 depend, either directly or indirectly, from claim 1 and, thus, each is allowable therewith.

In addition, claims 2-21 include features which serve to even more clearly distinguish the claimed invention over the prior art of record.

For example, with respect to claims 10 and 15, contrary to the Examiner's interpretation, *Kinoshita* fails to teach or suggest the recited feature that an active layer of the pump laser and an active layer of the vertical emitter are formed jointly in one epitaxy step.

According to *Kinoshita*, the vertical emitter (10) is grown in a first epitaxial growth step ("First of all, the highly reflective bottom DBR 2 is grown...") followed by an etching step where "[t]his assembly is processed to form the circular cylindrical mesa 10..." Then, an "[a]ctive layer MQW 7 for a pumping ring laser, ... are grown selectively around the periphery

of the circular cylindrical mesa 10" in a separate epitaxial growth step. See col. 4, lines 29-39 and 52-55 of *Kinoshita*. The pumping ring laser is the pump laser (30).

Therefore, in *Kinoshita*, an active layer of the pump laser (30) and an active layer of the vertical emitter (10) are not formed jointly in one epitaxy step. Rather, two separate epitaxy steps are required. If the Examiner remains of a contrary view, he is respectfully requested to point out exactly where in *Kinoshita* support for such a view exists.

Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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